

# FCC PART 22H, PART 24E MEASUREMENT AND TEST REPORT

For

## **CLC HONG KONG LIMITED**

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**FCC ID: 2AG4WB106** 

Report Type: Original Report		Product Name:	7
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Report Number:	RDG1612	207009C	
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## **TABLE OF CONTENTS**

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	
OBJECTIVE	
RELATED SUBMITTAL(S)/GRANT(S)	
TEST METHODOLOGY	
SYSTEM TEST CONFIGURATION	
JUSTIFICATION	
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
BLOCK DIAGRAM OF TEST SETUP	
SUMMARY OF TEST RESULTS	
FCC §1.1310 & §2.1093- RF EXPOSURE	9
APPLICABLE STANDARD	9
TEST RESULT	9
FCC §2.1047 - MODULATION CHARACTERISTIC	10
FCC § 2.1046, § 22.913 (A) & § 24.232 (C) - RF OUTPUT POWER	11
APPLICABLE STANDARD	11
Test Procedure	
TEST EQUIPMENT LIST AND DETAILS	12
TEST DATA	13
FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH	14
APPLICABLE STANDARD	
Test Procedure	14
TEST EQUIPMENT LIST AND DETAILS	
TEST DATA	15
FCC §2.1051, §22.917(A) & §24.238(A) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS	
APPLICABLE STANDARD	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	
FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS	
Applicable Standard	
Test Procedure	
TEST EQUIPMENT LIST AND DETAILS	
Test Data	22
FCC §22.917(A) & §24.238(A) - BAND EDGES	24
Applicable Standard	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	
TEST DATA	24

## Bay Area Compliance Laboratories Corp. (Chengdu)

FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY	27
APPLICABLE STANDARD	
Test Procedure	
TEST EQUIPMENT LIST AND DETAILS	28
TEST DATA	28



#### **GENERAL INFORMATION**

#### **Product Description for Equipment under Test (EUT)**

The *CLC HONG KONG LIMITED*'s product, model number: B106 (FCC ID: 2AG4WB106) (the "EUT") in this report was a *Play*, which was measured approximately: 11.6 cm (L) × 7.3 cm (W) × 1.05 cm (H), rated input voltage: DC3.7V rechargeable Li-ion battery or DC5V from adapter.

Adapter information:

Model: PM03

Input: 100-240V~50/60Hz 0.15A

Output: DC 5.0V, 500mA

\*All measurement and test data in this report was gathered from final production sample, serial number: 161207009 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2016-12-07, and EUT conformed to test requirement.

#### **Objective**

This report is prepared on behalf of *CLC HONG KONG LIMITED* in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

#### Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: 2AG4WB106. FCC Part 15C DSS submissions with FCC ID: 2AG4WB106.

Report No.: RDG161207009C Page 4 of 29

#### **Test Methodology**

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J, Part 22 Subpart H, Part 24 Subpart E.

Applicable Standards: TIA/EIA 603-D-2010.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu).

#### **Test Facility**

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.



#### **SYSTEM TEST CONFIGURATION**

#### **Justification**

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode.

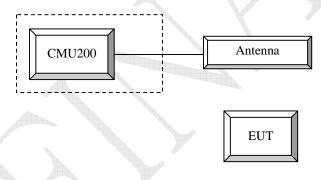
#### **Equipment Modifications**

No modification was made to the EUT.

#### **Support Equipment List and Details**

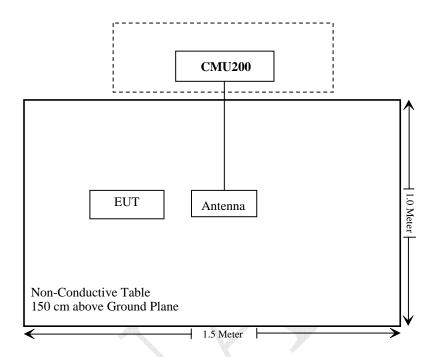
Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	11-9435686- 0111

#### **Configuration of Test Setup**



Report No.: RDG161207009C Page 6 of 29

## **Block Diagram of Test Setup**



Report No.: RDG161207009C Page 7 of 29

## **SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905 § 22.917; § 24.238	Occupied Bandwidth	Compliance
§ 2.1051, § 22.917 (a); § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053 § 22.917 (a); § 24.238 (a)	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a)	Out of band emission, Band Edge	Compliance
§ 2.1055 § 22.355; § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

Report No.: RDG161207009C Page 8 of 29

## FCC §1.1310 & §2.1093- RF EXPOSURE

#### **Applicable Standard**

FCC§1.1310 and §2.1093.

#### **Test Result**

Compliant, please refer to the SAR report: RDG161207009-20.



Report No.: RDG161207009C Page 9 of 29

## FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.



Report No.: RDG161207009C Page 10 of 29

#### FCC § 2.1046, § 22.913 (a) & § 24.232 (c) - RF OUTPUT POWER

#### **Applicable Standard**

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications...

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### **Test Procedure**

#### GSM/GPRS/EGPRS

Menu select > GSM Mobile Station > GSM 850/1900 Function:

Press Connection control to choose the different menus

Press RESET > choose all the reset all settings

Press Signal Off to turn off the signal and change settings Connection

Network Support > GSM + GPRS or GSM + EGSM

Main Service > Packet Data

Service selection > Test Mode A - Auto Slot Config. off

MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting

> Slot configuration > Uplink/Gamma > 33 dBm for GPRS 850

> 30 dBm for GPRS 1900

> 27 dBm for EGPRS 850

> 26 dBm for EGPRS 1900

BS Signal Enter the same channel number for TCH channel (test channel) and BCCH

channel

Frequency Offset > + 0 Hz

Mode > **BCCH** and **TCH** 

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH

channel (test channel) and BCCH channel]

Channel Type > Off

Report No.: RDG161207009C Page 11 of 29

#### Bay Area Compliance Laboratories Corp. (Chengdu)

P0 > 4 dB

Unchanged (if already set under MS signal) choose desired test channel Slot Config >

TCH >

Hopping > Off Main Timeslot >

CS4 (GPRS) and MCS5 (EGPRS) Network Coding Scheme >

2E9-1 PSR Bit Stream Bit Stream >

Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input AF/RF Connection Press Signal on to turn on the signal and change settings

#### Radiated method:

ANSI/TIA-603-D section 2.2.17

#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223- 02	1007726- 0113024	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-4223- 02	1007726-01 1315	2016-08-18	2017-08-18
Ducommun Technolagies	Horn Antenna	ARH-2823- 02	1007726-01 1312	2016-08-18	2017-08-18
R&S	Universal Radio Communication Tester	CMU200	11-9435686- 0111	2016-07-28	2017-07-27

<sup>\*</sup> Statement of Traceability: BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Report No.: RDG161207009C Page 12 of 29

#### **Test Data**

#### **Environmental Conditions**

Temperature:	24.1 °C
Relative Humidity:	36 %
ATM Pressure:	101.7 kPa

The testing was performed by Lorin Bian on 2016-12-15.

#### **Conducted Output Power**

#### Cellular Band (Part 22H) & PCS Band (Part 24E)

	Channel	Peak Output Power (dBm)						
Band	No.	GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot		
	128	32.71	32.64	30.30	28.36	25.99		
Cellular	190	32.61	32.57	30.35	28.32	26.16		
	251	32.65	32.60	30.44	28.39	26.29		
	512	29.36	29.37	27.56	25.86	22.50		
PCS	661	29.16	29.18	26.90	25.15	22.77		
	810	29.05	29.07	26.47	24.77	22.46		

#### EIRP/ERP:

		Danahuar	Substituted Method			Absolute		
Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	eading S.G. Antenna Cable Lo	Cable Loss (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	
	GSM 850 Middle Channel							
836.600	H	99.03	21.9	0.0	0.6	21.3	38.5	17.2
836.600	V	105.35	30.3	0.0	0.6	29.7	38.5	8.8
PCS 1900 Middle Channel								
1880.000	Н	95.46	21.8	8.0	0.9	28.9	33.0	4.1
1880.000	V	92.84	20.4	8.0	0.9	27.5	33.0	5.5

#### Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.

  2) Absolute Level = SG Level - Cable loss + Antenna Gain

  3) Margin = Limit-Absolute Level

Report No.: RDG161207009C Page 13 of 29

## FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH

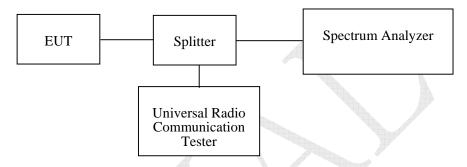
#### **Applicable Standard**

FCC §2.1049, §22.917 and §22.905, §24.238.

#### **Test Procedure**

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The 26 dB & 99% bandwidth was recorded.



#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Spliter	N/A	OE0120121	Each Time	/

<sup>\*</sup> Statement of Traceability: BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Report No.: RDG161207009C Page 14 of 29

#### **Test Data**

#### **Environmental Conditions**

Temperature:	27.3 °C
Relative Humidity:	41 %
ATM Pressure:	101.2 kPa

The testing was performed by Lorin Bian on 2016-12-21.

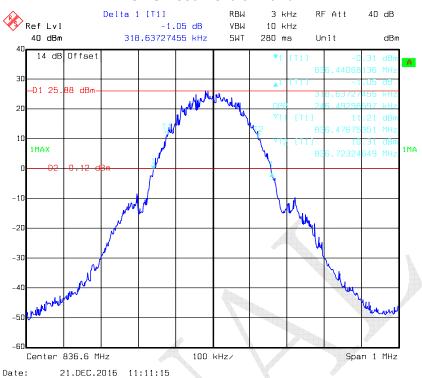
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	М	GSM	0.246	0.319
PCS	IVI	PCS	0.242	0.315

Report No.: RDG161207009C Page 15 of 29

#### **GMSK 850 Cellular Band**



#### **GMSK PCS Band**



## FCC §2.1051, §22.917(a) & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

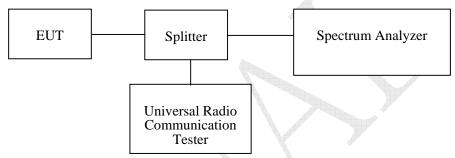
#### **Applicable Standard**

FCC §2.1051, §22.917(a) and §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

#### **Test Procedure**

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Spliter	N/A	OE0120121	Each Time	/

<sup>\*</sup> **Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Report No.: RDG161207009C Page 17 of 29

#### **Test Data**

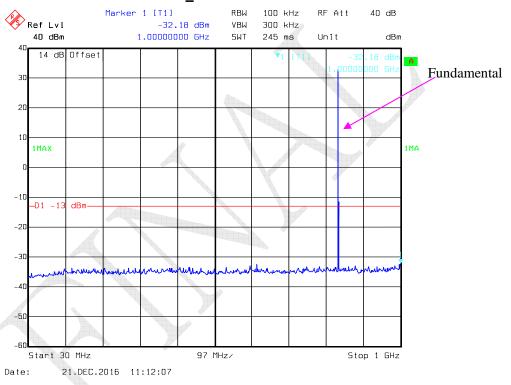
#### **Environmental Conditions**

Temperature:	27.3 °C
Relative Humidity:	41 %
ATM Pressure:	101.2 kPa

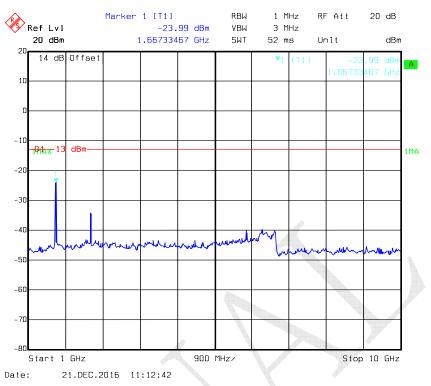
The testing was performed by Lorin Bian on 2016-12-21.

Please refer to the following plots.

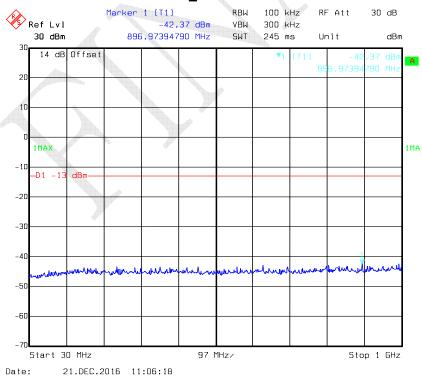
#### GSM850\_Middle Channel



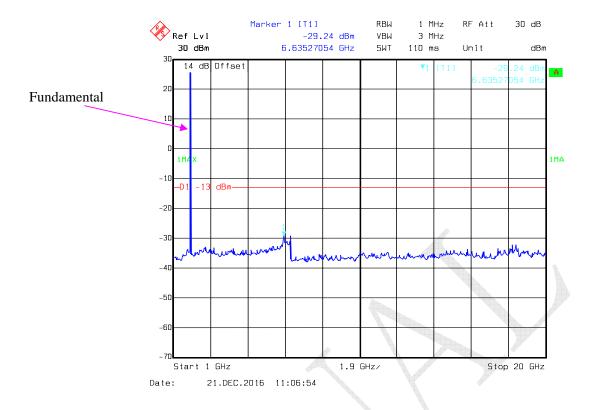
Report No.: RDG161207009C Page 18 of 29



#### PCS 1900\_ Middle Channel



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#### FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

#### **Applicable Standard**

FCC § 2.1053, §22.917 and § 24.238.

#### **Test Procedure**

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in  $dB = 43 + 10 Log_{10}$  (power out in Watts)

Report No.: RDG161207009C Page 21 of 29

#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223- 02	1007726- 0113024	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-4223- 02	1007726-01 1315	2016-08-18	2017-08-18
Ducommun Technolagies	Horn Antenna	ARH-2823- 02	1007726-01 1312	2016-08-18	2017-08-18

<sup>\*</sup> Statement of Traceability: BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### **Test Data**

#### **Environmental Conditions**

Temperature:	25.4 °C
Relative Humidity:	35 %
ATM Pressure:	101.7 kPa

The testing was performed by Lorin Bian on 2016-12-27.

Report No.: RDG161207009C Page 22 of 29

#### EUT Operation Mode: Transmitting

#### Cellular Band (PART 22H)

#### 30 MHz-10 GHz:

	Receiver		Su	Substituted Method				
Frequency (MHz)	Polar (H/V)	Reading (dBµV)	S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
GSM850, Frequency:836.600 MHz								
1673.200	Н	62.64	-40.5	7.9	0.8	-33.4	-13.0	20.4
1673.200	V	67.66	-33.7	7.9	0.8	-26.6	-13.0	13.6
2509.800	Н	44.18	-55.6	8.9	1.3	-48.0	-13.0	35.0
2509.800	V	50.46	-47.1	8.9	1.3	-39.5	-13.0	26.5
648.470	Н	35.52	-70.8	0.0	0.5	-71.3	-13.0	58.3
648.470	V	36.31	-69	0.0	0.5	-69.5	-13.0	56.5

## PCS Band (PART 24E)

#### 30 MHz-20 GHz:

				707		William,		
	Receiver		Su	Substituted Method				
Frequency   Polar	Reading (dBµV)	S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)		Limit (dBm)	Margin (dB)	
GSM1900, Frequency:1880.000 MHz								
3760.000	Н	67.73	-27.1	8.8	1.4	-19.7	-13.0	6.7
3760.000	V	68.81	-26.1	8.8	1.4	-18.7	-13.0	5.7
5640.000	Н	52.80	-40.3	10.3	1.8	-31.8	-13.0	18.8
5640.000	V	64.56	-28.6	10.3	1.8	-20.1	-13.0	7.1
7520.000	Н	54.93	-34.7	10.3	2.3	-26.7	-13.0	13.7
7520.000	٧	57.93	-33	10.3	2.3	-25.0	-13.0	12.0
648.470	Н	35.48	-70.8	0.0	0.5	-71.3	-13.0	58.3
648.470	V	36.17	-69.2	0.0	0.5	-69.7	-13.0	56.7

#### Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.

  2) Absolute Level = SG Level - Cable loss + Antenna Gain

  3) Margin = Limit-Absolute Level

Report No.: RDG161207009C Page 23 of 29

#### FCC §22.917(a) & §24.238(a) - BAND EDGES

#### **Applicable Standard**

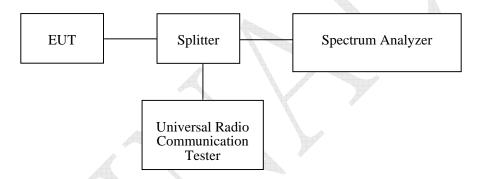
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB

#### **Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.



#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	Two-way Spliter	N/A	OE0120121	Each Time	/

<sup>\*</sup> Statement of Traceability: BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### **Test Data**

#### **Environmental Conditions**

Temperature:	27.3 °C
Relative Humidity:	41 %
ATM Pressure:	101.2 kPa

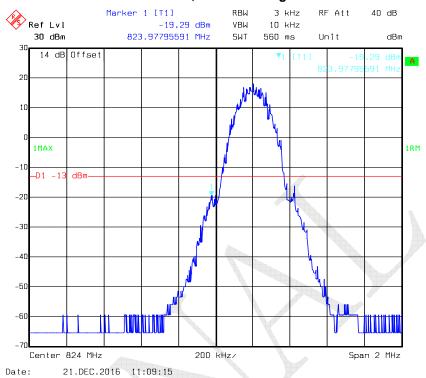
The testing was performed by Lorin Bian on 2016-12-21.

Report No.: RDG161207009C Page 24 of 29

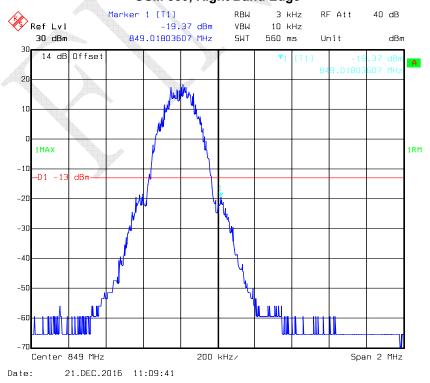
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following plots.

#### GSM 850, Left Band Edge

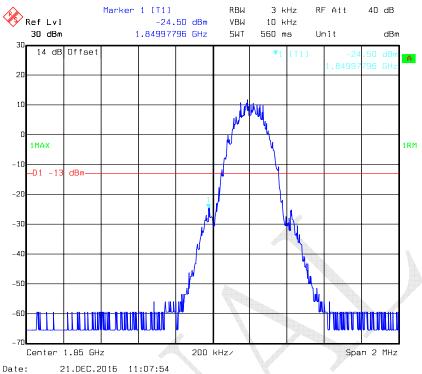


#### GSM 850, Right Band Edge



Report No.: RDG161207009C Page 25 of 29





#### GSM 1900, Right Band Edge



Page 26 of 29

#### FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY

#### **Applicable Standard**

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

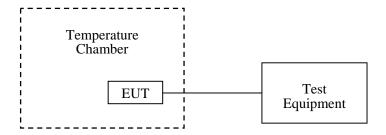
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

#### **Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Report No.: RDG161207009C Page 27 of 29

#### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01
FLUKE	Multimeter	1587	27870099	2015-12-30	2016-12-29
R&S	Universal Radio Communication Tester	CMU200	11-9435686- 0111	2016-07-28	2017-07-27
N/A	RF Cable	N/A	N/A	Each Time	/

<sup>\*</sup> Statement of Traceability: BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### **Test Data**

#### **Environmental Conditions**

Temperature:	26.9 °C
Relative Humidity:	40 %
ATM Pressure:	101.2 kPa

The testing was performed by Lorin Bian on 2016-12-20.

Report No.: RDG161207009C Page 28 of 29

## Cellular Band (Part 22H)

GMSK, Middle Channel, f <sub>c</sub> = 836.6 MHz						
Temperature	Voltage	Frequency Error	Frequency Error	Limit		
℃	V <sub>DC</sub>	Hz	ppm	ppm		
-30		-3	-0.004			
-20		-4	-0.005			
-10		-2	-0.002			
0		-6	-0.007			
10	3.7	-12	-0.014			
20		-8	-0.010	2.5		
30		-7	-0.008			
40		-12	-0.014	1		
50		-5	-0.006			
25	3.5	-6	-0.007			
25	4.2	-8	-0.010			

## PCS Band (Part 24E)

GMSK, Middle Channel, f <sub>c</sub> = 1880.0 MHz						
Temperature	Voltage	Frequency Error	Frequency Error	Result		
℃	V <sub>DC</sub>	Hz	ppm			
-30		-7	-0.004			
-20		-6	-0.003			
-10		-11	-0.006			
0		-7	-0.004			
10	3.7	-4	-0.002			
20		-9	-0.005	Compliance		
30		-6	-0.003			
40		-5	-0.003			
50		-8	-0.004			
25	3.5	-7	-0.004			
25	4.2	-4	-0.002			

\*\*\*\*\* END OF REPORT \*\*\*\*\*

Report No.: RDG161207009C Page 29 of 29